

NAS NORTH ISLAND - NAVY REGION SOUTHWEST NAVY ENVIRONMENTAL LEADERSHIP PROGRAM

CLEANUP

PILOT SOIL VAPOR EXTRACTION SYSTEM

LEAD ACTIVITY

Naval Air Station (NAS) North Island

STATUS

Completed

MISSION

Evaluate soil vapor treatment system. Use catalytic oxidation to treat effluent.

DESCRIPTION

NAS North Island completed a pilot-scale demonstration of the Terra Vac, Inc. soil vapor extraction (SVE) system at Site 11, the Industrial Waste Treatment Plant to evaluate the feasibility and effectiveness of the technology to remove VOCs from the groundwater and soil. The SVE system combined air sparging, soil vapor extraction, and catalytic oxidation (CATOX) technologies to destroy contaminants.

For the pilot test, an array of two air injection and six extraction wells were installed. The wells were connected by manifold piping to an air compressor and blower to provide pressure for sparging and vacuum for extraction. The air injection wells, which were screened in the upper portion of the saturated zone, were used to remediate groundwater by injecting air under pressure to sparge the groundwater.

During sparging, air released into the saturated zone causes bubbles to form, which allows VOCs in the groundwater to diffuse into the rising bubbles. When the bubbles reach the vadose zone, the contaminants are removed via vapor extraction wells installed in the unsaturated zone. The location and distribution of sparging and extraction wells are determined on a site-specific basis. The extraction wells are connected to a liquid-gas separator, where any liquid is removed.

Once liquids are removed, the air effluent is treated using a CATOX unit, which consists of a catalyst especially designed to oxidize VOCs into carbon dioxide and water vapor. The CATOX unit has a demonstrated destruction efficiency of 99 percent. Operation and construction of the CATOX unit required a permit from the San Diego County Air Pollution Control District.

During the pilot study, up to 250 pounds (33 gallons) per day of VOCs was effectively removed from the vadose zone at Site 11 and subsequently destroyed using the CATOX unit. The results indicated that the soils and contaminant mass distribution were

amenable to remediation using this technology. Based on the results of the pilot-scale study, a full-scale SVE system was designed to remediate groundwater and vadose zone contamination at Site 9, the Chemical Waste Disposal Area, and at Site 11. However, vapor-phase carbon adsorption was selected for off-gas treatment. Construction of the full-scale SVE system at site 11 is complete and now in operation.

BIBLIOGRAPHY

- Science Application International Corporation. Engineering Evaluation and Cost Estimate for Sites 9 and 11. 1993.
- Science Application International Corporation. Action Memorandum and Remedial Action Plan. 1995.
- Science Application International Corporation. Work Plan for the Phase II Soil Vapor Extraction Pilot Test. June 1995.

UPDATED: 01/23/02